

1 – 8. (cancelled)

9. (new) A distributed global clock for clusters of computers having a plurality of processing nodes, the distributed global clock comprising:

a plurality of pulse generator modules that are interconnected forming a hierarchical structure with a single said pulse generator module at the top of said hierarchical structure; this said single pulse generator module generating clock pulses that are sent down through said hierarchical structure;

a plurality of local time counter modules, one for each node of the cluster; each said local time counter module containing a counter that is incremented by the pulses sent by said single pulse generator module at the top of said hierarchical structure;

a plurality of interconnecting cables for interconnecting said local time counter modules to said pulse generator modules, and these said pulse generator modules among themselves forming said hierarchical structure; the lengths of said interconnecting cables varying within limits that guarantee that a difference in propagation time of signals coming from said single pulse generator module at the top of said hierarchical structure and reaching any pair of said local time counter modules does not exceed a cycle time of the pulses generated by said single pulse generator module at the top of said hierarchical structure; and

a means for any processing node to provide a reset signal to its said local time counter module for simultaneous initialization of all said local time counter modules of the distributed global clock;

once provided, said reset signal is sent up through said hierarchical structure of said pulse generator modules, reaches said single pulse generator module at the top of said hierarchical structure, and is sent back down through said hierarchical structure of said pulse generator modules reaching all said local time counter modules simultaneously;

on arrival from said pulse generator modules, said reset signal initializes the counters of all said local time counter modules simultaneously and, after such initialization,

the pulses generated by said single pulse generator module at the top of said hierarchical structure increment synchronously the counters of all said local time counter modules of the distributed global clock.

10. (new) A distributed global clock for clusters of computers according to claim 9, characterized by said interconnecting cables having a specific length varying within limits that guarantee that a difference in propagation time of said reset signal between said single pulse generator module at the top of said hierarchical structure and any pair of said local time counter modules does not exceed the cycle time of the pulses generated by said single pulse generator module at the top of said hierarchical structure.

11. (new) A distributed global clock for clusters of computers according to claim 9, characterized by said interconnecting cables having lengths varying up to d meters, with $d = v/f$, where v (in meters/second) is a propagation speed of electromagnetic signals through said interconnecting cables and f (in Hertz) is a frequency of the pulses generated by said single pulse generator module at the top of said hierarchical structure; said frequency being a frequency of the distributed global clock.

12. (new) A distributed global clock for clusters of computers according to claim 9, characterized in that, in said hierarchical structure of said pulse generator modules, each said pulse generator module contains a fixed number of connections to said pulse generator modules directly below in said hierarchical structure, or to said local time counter modules if said pulse generator module is at the bottom of said hierarchical structure of said pulse generator modules, and an extra connection to interconnect it with said pulse generator module above in said hierarchical structure.

13. (new) A distributed global clock for clusters of computers according claim 9, where each said pulse generator module has one of:

a pulse detector apparatus associated with a connection of said pulse generator module, which allows said pulse generator module to detect automatically whether or not it is at the top of said hierarchical structure; and

an electromechanical key to tell to said pulse generator module that it is at the top of said hierarchical structure.

14. (new) A distributed global clock for clusters of computers according to claim 9, characterized by a means of propagating clock pulses through said interconnecting cables such that said pulse generator modules in intermediate levels of said hierarchical structure:

propagate clock pulses received from said pulse generator modules above in said hierarchical structure to said pulse generator modules below in said hierarchical structure, or to said local time counter modules if said pulse generator module is at the bottom of said hierarchical structure of said pulse generator modules; and

propagate reset signals received from said pulse generator modules below in said hierarchical structure, or from said local time counter modules if said pulse generator module is at the bottom of said hierarchical structure of said pulse generator modules, to said pulse generator modules above in said hierarchical structure and vice-versa.

15. (new) A distributed global clock for clusters of computers according to claim 9, characterized by a means of propagating reset signals through said interconnecting cables such that:

reset signals provided by any processing node are sent by the corresponding said local time counter modules to said hierarchical structure of said pulse generator modules;

each said pulse generator module uses a logical OR gate to join all reset signals that arrive to it (or an AND gate, if the reset signals are active on logical zero) coming from said pulse generator modules below in said hierarchical structure (or from said local time counter modules if said pulse generator module is at the bottom of said hierarchical structure of said pulse generator modules); and

the output of this OR gate (or an AND gate, if the reset signals are active on logical zero) is sent below or above said hierarchical structure, depending on whether said pulse generator module is at the top of said hierarchical structure or not, respectively.

16. (new) A distributed global clock for clusters of computers according to claim 9, characterized by a means of propagating the reset signals through said interconnecting cables where said single pulse generator module at the top of said hierarchical structure joins the reset signals that arrive to it using a logical OR gate (or an AND gate, if the reset signals are active on logical zero) and sends the output of this logical gate to said pulse generator modules below in said hierarchical structure; the reset signal propagating down through said hierarchical structure until arriving simultaneously, within the same clock cycle, into all said local time counter modules.